

Management of Local Anesthetics Systemic Toxicity in a 78 Year Old Man Undergoing Remove of Inplate

Wike Yuliana¹, Heri Dwi Purnomo¹

¹ Department of Anesthesiology and Intensive Therapy, Universitas Sebelas Maret, Surakarta, Indonesia

ABSTRACT

Background: Local anesthetics have been widely used over the past 50 years in many clinical practices, ranging from emergency departments to operating rooms. Local anesthetics systemic toxicity (LAST) is a life-threatening condition when the effects of local anesthetics reach the systemic circulation with an incidence of 0.03% or 0.27 incidence of 1000 episodes of Peripheral nerve block (PNB).

Case: We report a 78-year-old male who underwent of remove of inplate (ROI) and open reduction internal fixation (ORIF) reconstruction. Preoperative physical examination revealed GCS E4V5M6, blood pressure 195/76, other vital signs within normal limits, SpO₂ 99% in the supine position. On examination of the lungs, there were increased bronchial breath sounds and rough crackles, especially in the 2-5 left intercostal space. Other physical and laboratory examinations were within normal limits. The patient was hemodynamically stable after infusion lipid emulsion. The main principle of LAST management is to ensure adequate ventilation and organ perfusion with sufficient oxygen-rich blood to reach the brain, heart, and kidneys to prevent acidosis until lipid emulsion therapy.

Conclusion: LAST management requires prompt and precise diagnosis and treatment to get a good outcome.

Keywords: interscalene block, LAST, lipid emulsion, remove of inplate

Correspondence:

Wike Yuliana, dr*
Department of Anesthesiology
and Intensive Therapy,
Universitas Sebelas Maret,
Surakarta, Indonesia
e-mail: wike18dr@gmail.com



Received: July 2021, **Revised:** August 2021, **Published:** September 2021

How to cite this article: Yuliana, W, HD Purnomo. Management of local anesthetics systemic toxicity in a 78 year old man undergoing remove of inplate. *Journal of Anaesthesia and Pain*. 2021;2(3):112-115. doi: 10.21776/ub.jap.2021.002.03.05

INTRODUCTION

Local anesthetics have been widely used in the emergency room and operating room.¹ The application the use of local anesthesia (LA) varies and is generally classified as safe and effective if it is limited to the site of therapy, such as tissue infiltration, nerve blockade, or nerve plexus.²

Peripheral nerve block (PNB) is indicated in patients who are at high risk of respiratory depression due to general anesthesia (GA), patients who wish to avoid systemic treatment, or patients who are intolerant of oral medication.³ In surgery for the shoulder, upper arm, and clavicle, interscalene block, and superficial cervical block may be used.⁴

Local anesthetic systemic toxicity (LAST) is a life-threatening condition when the effects of local anesthetics reach the systemic circulation with an incidence of 0.03% or 0.27 incidence of 1000 PNB done.^{2,5} The risk of LAST can be increased in the presence of cardiovascular disorders, age too young or too old, renal disorders, as well as medication being used.⁵ The manifestations of LAST can vary depending on the type of anesthetics used.⁶

Due to the rarity and severity of LAST cases and limited case reports related to LAST management, especially LAST in PNB, the author was interested in discussing LAST management in a 78-year-old male patient who underwent reconstructive removal of inplate (ROI) and open reduction internal fixation (ORIF) with screwing indicated for close fracture of left clavicle Allman Group II post internal fixation with loss of fixation.

CASE

A 78-year-old man came to the orthopedic clinic in Dr. Moewardi Hospital, Surakarta, to undergo ROI and ORIF with screwing indicated for close fracture of left clavicle Allman Group II, post internal fixation with loss of fixation eight months ago along with the history of head injury with GCS E3V5M6. The patient had a history of uncontrolled hypertension since five years ago. The patient denied any history of allergies, alcohol consumption, or other drugs.

The results of the physical examination were GCS E4V5M6, blood pressure 195/76 mmHg, pulse rate 78 beats per minute, respiration rate 22 times per minute. The oxygen

saturation was 98% with room air. On the lung examination, crackles were heard in the 2nd-5th intercostal space. There was a surgical scar in the left supraclavicular (S) region. Other physical examinations were within normal limits.

The blood examination result showed hemoglobin 12.1 g%, hematocrit 36%, leukocyte 7,600/mm³. The chest x-ray showed active pulmonary tuberculosis with extensive lesions with tuberculoma, aortosclerosis, and internal fixation attached to the lateral 1/3 of the left clavicle with a fracture line as depicted in figure 1. Figure 2 showed the electrocardiography result sinus arrhythmic rhythm, 85 beats per minute, the normal axis with ventricular extrasystole two times per minute.

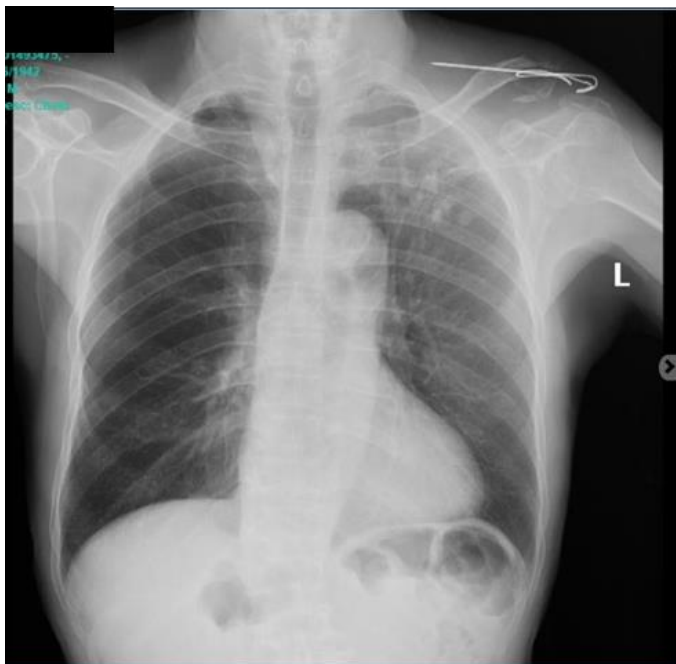


Figure 1. Chest x-ray showing active pulmonary tuberculosis with the extensive lesion, aortosclerosis, and internal fixation attached to the lateral 1/3 of the left clavicle.

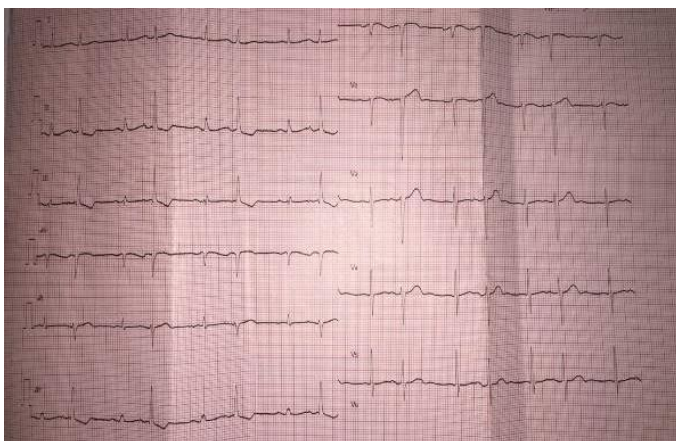


Figure 2. Electrocardiogram showing sinus arrhythmic rhythm, 85 beats per minute, the normal axis with ventricular extrasystole two times per minute

Management of Anesthesia

After receiving education about surgery and obtaining medical consent from the family, the patient was taken to the operating room and monitored according to the American Society of Anesthesiologists' recommendation. From the monitor, the patient's measured blood pressure was 141/68

mmHg, pulse rate was 98 times per minute, respiratory rate was 21 times per minute with SpO₂ of 100%.

The patient was given 10 cc/kg of ringer lactate crystalloid fluid. Calculation of allowable blood loss was 607.5 cc. Oxygenation during surgery was with a 3 lpm nasal cannula. Premedication was with fentanyl 1 mcg/kg. The patient was prepared in a supine position with his head turned to the right. The hands were positioned parallel to the knees. After the landmark was found, the Stimuplex needle was inserted 30-40° caudally with a depth of 2-2.5 cm. The local anesthetic injection was performed with Levobupivacaine 0.375% 10 cc. The superficial cervical blockade was performed by injection of Levobupivacaine 0.25% 10 cc along the posterior margin of sternocleidomastoid muscle incrementally and massaged to prevent hematoma.

Shortly after injection, the operation was started, the blood pressure measured on the monitor gradually decreased to 60/40 mmHg, and the patient experienced a decrease in consciousness until GCS E1V2M3. Oxygenation with 100% oxygen was given immediately. Intubation was then performed to secure the airway after induction of Ketamine 1 mg/kg and Atracurium 0.5 mg/kg given as muscle relaxants. A 7.5 endotracheal tube was installed to a depth of 21 cm. Auscultation was performed to ensure that breath sounds were heard in both lung fields. A 1.5 cc/kg rapid bolus of 20% lipid emulsion injection was given, followed by administration of 0.25 cc/kg/minute until hemodynamic stabilization. After reassessment, the bolus was continued for up to 10 minutes, and the patient was monitored for up to 12 hours after the emulsion was administered.

The patient was stable during the operation, which lasted 30 minutes, as shown in figure 3. The systolic blood pressure ranged from 132-150 mmHg, and the diastolic blood pressure was between 67-98 mmHg. The pulse rate was between 72-81 beats per minute with a SpO₂ of 97-99%. The patient was extubated in the Intensive care unit (ICU) one day postoperatively.

Postoperative Management

Postoperatively, the patient was admitted to the ICU for one day then transferred to the High care unit (HCU). Postoperative management was with fentanyl analgesia 0.5 mcg/kg/hr. Patient's hemodynamics of the patient on the third postoperative day was stable (Figure 4). The patient was transferred to the ward and dismissed after 4 days.

DISCUSSION

Interscalene block and superficial cervical block are indicated for surgery in the clavicle, shoulder, and upper arm (except medial), and sometimes combined with basic general anesthesia.^{4,7} Selection of LA drugs is based on the onset, duration, and sensory-motor fiber blockade, and potential systemic toxicity.⁷ Levobupivacaine is a levorotatory isomer mixed with racemic bupivacaine with more arrhythmogenic effects, cardiac depression, and lower central nervous depression.⁸ In this patient, we used levobupivacaine due to its lower cardiotoxicity.

LA toxicity can occur when large amounts of LA enter the systemic circulation, suprathreshold blood, and tissues.⁹ LAST usually begins with prodromal symptoms and signs such as perioral numbness, tinnitus, agitation, dysarthria, and progress to loss of consciousness, convulsions, to coma. In our case, this event began when he started to lose his consciousness

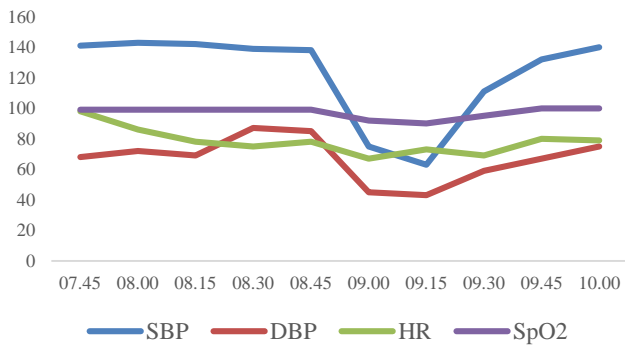


Figure 3. Graphic of hemodynamics durante operation (SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate; SpO₂ = oxygen saturation)

apnea, or cardiac arrest, invasive airway management should be considered.^{9,10} We intubate the patient to control his airway.

The main principle of LAST management is to ensure adequate ventilation and organ perfusion with oxygen-rich blood to the brain, heart, and kidneys to prevent acidosis until lipid emulsion therapy.¹⁰ We give him lipid emulsion as stated in the algorithm. The use of lipid emulsion should be started as early as possible by bolus followed by an infusion, and evaluation should be done carefully. After hemodynamic stability is obtained, lipid emulsion infusion is continued for 10 minutes, and the patient should be evaluated for up to 12 hours post-administration.² Lipid emulsion has a scavenging effect that can extract LA from plasma.⁹⁻¹¹

Prevention of LAST can be done by using guiding ultrasound, doing the injection incrementally, and using a lower volume of LA.² In this patient, ultrasound guiding was not done due to the consent of the patient.



Figure 4. (A). Monitor displaying hemodynamics of the patient on the third postoperative day; (B) The patient on the third postoperative day

then the blood pressure began to drop. LAST management consists of 3 pillars, namely seizure management, Advanced cardiac life support (ACLS), and administration of 20% lipid emulsion.¹⁰ Oxygen supplementation should be given, but in patients with unstable hemodynamics such as arrhythmias,

CONCLUSION

Management of LAST requires prompt and precise diagnosis and treatment for a good outcome for the patient.

ACKNOWLEDGMENT

-

CONFLICT OF INTEREST

None

REFERENCES

- Hasan B, Asif T, Hasan M. Lidocaine-Induced Systemic Toxicity: A Case Report and Review of Literature. *Cureus*. 2017;9(5):1275. doi:10.7759/cureus.1275
- Gitman M, Fettiplace M, Weinberg G. Local Anesthetic Systemic Toxicity. In: *Hadzic's Textbook of Regional Anesthesia and Acute Pain Management*. 2nd ed. China: McGraw-Hill Education; 2017.
- Chang A, Dua A, Singh K, White BA. Peripheral Nerve Blocks. StatPearls [Internet]; 2020. <https://www.ncbi.nlm.nih.gov/books/NBK459210/>
- Jankovic D, Peng P. *Regional Nerve Blocks in Anesthesia and Pain Therapy-Traditional and Ultrasound-Guided Techniques*. 4th ed. Switzerland: Springer; 2015.
- El-Boghdady K, Pawa A, Chin KJ. Local anesthetic systemic toxicity: current perspectives. *Local Reg Anesth*. 2018;11:35-44. doi:10.2147/LRA.S154512
- Auyong DB, Yuan SC, Choi DS, Pahang JA, Slee AE, Hanson NA. A Double-Blind Randomized Comparison of Continuous Interscalene, Supraclavicular, and Suprascapular Blocks for Total Shoulder Arthroplasty. *Reg Anesth Pain Med*. 2017;42(3):302-309. doi:10.1097/AAP.0000000000000578

7. Butterworth IV JF, Mackey DC, Wasnick JD. *Morgan & Mikhail's Clinical Anesthesiology*. 6th ed. United States: McGraw-Hill Education; 2018.
8. Joseph Makram Botros ML boulos. Comparative study between a combination of lidocaine and levobupivacaine and that of lidocaine, levobupivacaine, and dexmedetomidine during peribulbar anesthesia for phacoemulsification cataract surgery. *Ain-Shams Journal of Anesthesiology*. 2017;10(1):224-229. doi:10.4103/1687-7934.238462
9. Ok SH, Hong JM, Lee SH, Sohn JT. Lipid emulsion for treating local anesthetic systemic toxicity. *Int J Med Sci*. 2018;15(7):713-722. doi:10.7150/ijms.22643.
10. Kien NT, Giang NT, Manh B van. Successful intralipid-emulsion treatment of local anesthetic systemic toxicity following ultrasound-guided brachial plexus block: case report. *Int Med Case Rep J* . 2019;28(12):193-197. doi:10.2147/IMCRJ.S207317
11. Sepulveda EA, Pak A. Lipid Emulsion Therapy. StatPearls [Internet]; 2020. <https://www.ncbi.nlm.nih.gov/books/NBK549897/>